CLAIMS

1/ A rotary electric machine having a flux-concentrating rotor comprising permanent magnets disposed between pole pieces and a stator with windings on teeth.

2/ A machine according to claim 1, wherein the shape of the pole pieces and the shape of the magnets are chosen in such a manner as to minimize the difference $L_d - L_q$ where L_d is inductance on the forward axis and L_q is inductance on the quadrature axis.

3/ A machine according to claim 1, wherein the teeth are of non-constant width, increasing in width with increasing distance from the rotor starting from a certain distance from their free ends.

4/ A machine according to claim 1, wherein the magnets are wedge-shaped when observed along the axis of rotation of the rotor, of width that tapers going away from the axis of rotation of the rotor.

5/ A machine according to claim 1, wherein the pole pieces have cutouts and are engaged via said cutouts on splines on the shaft.

6/ A machine according to claim 5, wherein said splines are formed integrally with a central portion of the shaft.

7/ A machine according to claim 6, wherein the splines and the central portion of the shaft are made of a non-magnetic material, in particular of aluminum.

8/ A machine according to claim 5, wherein gaps are left between the radially inner edges of the pole pieces and the shaft.

9/ A machine according to claim 5, wherein the cross-section of each spline presents a profile having opposite sides with inclined portions at an angle ii to a radius passing through the middle of the spline, said angle being selected in such a manner as to make it possible for said splines to be made out of a material having weaker shear strength than the material used for making the pole pieces.

10/ A machine according to claim 9, wherein the angle ii is about 70°.

11/ A machine according to claim 9, wherein said profile includes rounded portions.

12/ A machine according to claim 11, wherein the rounded portions have different radii of curvature.

13/ A machine according to claim 1, wherein each pole piece has, on its side facing towards the stator, a face that bulges being convex towards the stator.

14/ A machine according to claim 1, wherein the rotor has at least one end cheek-plate of non-magnetic material, with the periphery thereof being set back from the edges of the magnets which are adjacent to the stator.

15/ A machine according to claim 1, the stator having n_{teeth} teeth, the rotor having n_{pairs} pairs of poles, and the electricity being AC having n_{phases} phases, wherein the number of teeth n_{teeth} is selected in such a manner as to satisfy the following relationship $n_{teeth} = n_{pairs} * n_{phases}$.

16/ A machine according to claim 1, wherein the rotor is arranged to rotate at a speed lying in the range 1000 rpm to 10,000 rpm.

17/ A machine according to claim 1, wherein its outside dimension in the radial direction lies in the range 50 mm to 1 m.

18/ A machine according to claim 1, wherein the stator has individual coils.

19/ A machine according to claim 1, wherein the stator has at least one individual coil comprising a substantially flat bundle of insulated wires wound around a winding axis in such a manner as to form a plurality of superposed turns, the cross-section of the bundle in the superposed turns having a long dimension that extends substantially perpendicularly to the winding axis of the coil.

20/ A machine according to claim 19, wherein the wires are of circular section, having a diameter lying in the range 0.3 mm to 2.5 mm.

21/ A machine according to claim 19, wherein the inside section of the coil is substantially rectangular.

22/ A machine according to claim 19, wherein the inside section of the coil is larger on one side than on the other, thereby enabling it to be mounted on a tooth presenting a complementary profile with a certain amount of clamping.

23/ A machine according to claim 19, wherein the wires are stripped at the electrical connection ends of the coil and curved to form hooks.

24/ A machine according to claim 23, wherein the hooks are directed towards a midplane of the coil, perpendicular to the winding axis.

25/ A machine according to claim 19, wherein the coil has an inside section of long side longer than the axial dimension of the tooth on which the coil is engaged so as to leave a gap which is sufficient to receive a detector suitable for delivering a signal representative of rotation of the rotor.

26/ A machine according to claim 1, having at least one detector comprising a magnetic field sensor mounted on the stator in such a manner as to detect the magnetic field of the magnets of the rotor from a location that overlaps a peripheral region of the rotor when the machine is observed on the axis of rotation of the rotor.

27/ A machine according to claim 26, for n-phase AC, the machine having n detectors mounted on consecutive teeth close to an opening in a case of the machine.

28/ A machine according to claim 26, wherein the detector(s) is/are fixed to the magnetic circuit of the stator so as to extend along the radial axis of a tooth.

29/ A machine according to claim 26, wherein the or each detector includes not only a magnetic field sensor, but also a temperature sensor.

30/ A machine according to claim 1, wherein the rotor has at least one cheek-plate of non-magnetic material, with the radially outer edge of said cheek-plate being set back from the radially outer edge of the magnet and the pole pieces, so as to leave an annular region in which the magnetic field of the magnet(s) can be read by one or more detectors.

31/ A machine according to claim 1, having individual coils with connection ends formed by respective flat bundles of stripped wires curved to form respective hook

shapes, said connection ends being soldered to locally stripped portions of sheathed electric cables.

32/ A machine according to claim 1, wherein the magnetic circuit of the stator is made up of an assembly of sectors defining air-gaps intersecting the teeth at half-width.

33/ A machine according to claim 32, wherein the sectors have co-operating portions in relief on their docking sides.

34/ A machine according to claim 1, wherein the magnetic circuit of the stator is inserted by force into a cylindrical case.

35/ A machine according to claim 1, constituting a synchronous motor.